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ABSTRACT

A modeling procedure involving dynamic interactions was used to train three language-delayed preschool children to emit five-element syntactic responses. A single-subject multiple baseline design using within- and across-subject replication was employed to study the acquisition of expanded "agent-action-object" sentences and the spontaneous generation of this form in the natural environment. A familiar person, using an object known to the child, demonstrated a common action, and the symbolic form which described this event was modeled for the child. The generalization and maintenance of the lexicon and syntax trained were tested by contextual probes and responses to video tape presentations. The result demonstrated the effectiveness of the training strategy. Probes revealed generalization and maintenance of both lexical and syntactical forms acquired in treatment. Significant increases in each S's spontaneous usage of the basic syntactical form in the natural environment, i.e., the classroom during free play, were documented. (Author/SB)

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A Language Training Strategy for Teaching Young Language-Delayed Children a Functional Syntactical Form

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Nashville, Tennessee

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Running head: Training Functional Expressive Language

A Language Training Strategy for Teaching Young Language-Delayed Children a Functional Syntactical Form

The effectiveness of behavioral techniques to teach expressive language has been well documented in recent years. These tactics have been used to teach such constructs as plural inflections (Sailor, 1971), past tense (Schumaker & Sherman, 1970), and simple and compound sentence structures (Stevens-Long & Rasmussen, 1974) and the generative usage of specific grammatical rules. However, further research is needed to document the training and generalization of even more complex syntactic structures (Garcia, Guess, & Byrnes, 1973), especially the spontaneous usage of both trained and novel responses in the child's natural environment (Miller & Yoder, 1974).

Although operant theory (Skinner, 1957) has provided a functional analysis of the behavior being investigated, it does not specify the sequence of grammatical structures to be programmed (Miller & Yoder,

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1974). The data provided by developmental psycholinguistic research (Bloom, 1973; Bowerman, 1974; Brown, 1973) serves as a guide in planning programs by indicating the relatively stable stages in language acquisition. Moreover, these studies have contributed to the trend which emphasizes the importance of attaching meaning to a child's utterance and the necessity of choosing training items which are relevant to the child, i.e., the experiences with people, objects, and events that occur frequently in his environment. Past studies have incorporated the training of responses relevant to the child, but have typically used picture cards and static objects (Lutzker & Sherman, 1974; Wheeler & Sulzer, 1970) to train the desired responses.

The present study was designed to examine the effectiveness of the intervention procedure of modeling and differential reinforcement to train a complex syntactic structure whose trained exemplars are persons, actions, and objects relevant to the subjects. A major consideration of this investigation was to examine the occurrence of the trained responses in the subject's natural environment, i.e., the classroom during free play. In addition, the spontaneous generation of the trained syntactical form to untrained video tape contexts was monitored. The study presented outlines a language training strategy which is a synthesis of the developmental-linguistic and behavioral models for teaching children a complex syntactic structure.

Method

Setting

This study was conducted at the Regional Intervention Program in Nashville, Tennessee. The Regional Intervention Program is a data-based parent-implemented program providing comprehensive services to parents and their handicapped preschool children. The service modules of the program are designed to systematically teach the parents what to do at home in order to manage their child's behavior and to teach their child essential prelanguage, language, and self-help skills. The preschool component prepares the child for ongoing placement by focusing on the child's behavior in a group setting and the development of his motor, language, and peer interaction skills. This investigation took place in the Language Classroom of the Regional Intervention Program. The classroom schedule, materials, and equipment resemble those of any preschool in the community. The materials used in training were objects available in any preschool--balls, a doll buggy, dolls, blocks, clothing, and so forth.

Subjects

Three children, 3.7, 4.8, and 5 years of age, served as subjects. All three subjects were male. They displayed a wide array of behavioral deficits including disruptive oppositional behaviors, lack of social interaction with peers, and delayed language. That is, naturalistic observation indicated the children emitted only one or two

words of the agent-action-object form to be trained. Each subject had zero criterion performance on the specific words and syntax of the response items to be trained. Two mothers of children in the Regional Intervention Program served as trainers.

Procedures

The experimental design of this study was a single-subject multiple baseline design. Replication of treatment effects was demonstrated across three subjects. Three sets of 10 agent-action-object responses were trained. Each set included persons, activities, and materials relevant to each child. The following are examples of responses used in each set: (1) Ann (trainer) is stacking the blocks, (2) Floyd (peer) is rocking the boat, and (3) Linda (other adult) is throwing the ball.

Data collection. Two types of data were taken during this study: daily posttraining data and generalization data. Across all conditions in the training and generalization settings each of the subject's responses was coded by data collectors seated nearby and separated from one another by solid partitions. Data was recorded on specially designed sheets which allowed each component of the agent-action-object response to be judged.

The naturalistic generalization data was collected daily during the free play period. Each child was observed for a total of 6 minutes each day. The 18-minute observation period was divided into nine 2-minute segments. Continuous data on one child's behaviors were

recorded during any given 2-minute segment. The language behaviors recorded during the free play setting were of two basic syntactic structures: (1) agent-action-object and (2) other sentences which included a subject and a predicate. These two basic structures were both operationally defined.

Two video tapes consisting of 15 randomly assigned and ordered agent-action-object events (five events from each of the three trained response sets) were additional probes to monitor the effects of training and generalization to another untrained stimulus setting. The first video tape was given to each child at four points in time: during the pretraining condition and immediately after the child had reached criterion on each of the three response sets. The second video probe tape was presented after all the subjects had finished training on all the response sets and was readministered six weeks later. Responses to the video probes were scored in the same manner as the posttraining probes.

Interrater reliability was established to a minimum criterion of 90% agreement for three consecutive days on posttraining probes and of 80% agreement for three consecutive days on naturalistic generalization data prior to the onset of training.

Training procedure. The basic training procedure used in the study was one in which a peer/trainer/other adult performed a short demonstration of a specific action using a designated object. As the

action was being performed the trainer said, "What's happening?" If the subjects responded correctly, that is, if all the elements of the response were correct, the trainer reinforced the subject by praising and touching him. On the other hand, if the subject responded incorrectly, the trainer turned her head away three seconds. The action was performed again, and the trainer repeated the stimulus question and prompted the correct response. This procedure was repeated as needed, but not more than three consecutive times on any one response item. The trainer reinforced all correct or prompted responses with praise and touch.

Subsequent to the daily training sessions there was a posttraining probe on the 10 responses trained. Each of the items in the set was randomly presented. In a similar manner, three randomly selected responses from the other sets were probed. Training continued on each set until the child had attained a minimum of 90% correct for three consecutive days on the posttraining probes.

Results

Reliability

Reliability checks were taken for each child on posttraining probes, video probes, and free play observations. Reliability was calculated by dividing the total number of agreements by the total number of agreements plus disagreements. Reliability on posttraining and video probes was determined by calculating the agreements within each component of all agent-action-object responses. For free play generalization,

calculations were made on a cell-by-cell basis; that is, agreements within each 10-second cell were calculated. A total of 75 posttraining probe reliability checks was conducted, with a mean reliability of 95%, 98%, and 92% for subjects 1, 2, and 3, respectively. Reliability assessments were made on 8 of the 18 video probes, with a mean reliability of 100%. Reliability on free play generalization had a mean of 96% across a time span of 61 days. Reliability was taken across experimental conditions on 21 of the 61 days that data were collected.

Posttraining Probe Data

Figure 1 presents the contextual probe data for subjects 1, 2, and 3, respectively. These data reflect that experimental control across

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Insert Figure 1 about here

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all three treatment conditions was demonstrated. Subjects 1, 2, and 3 learned specific responses only following the onset of training, and these responses were maintained through posttraining on each of the response sets.

Subject 1. Of 156 response items probed during posttraining phases, subject 1 had 150 correct responses. Six weeks of posttraining data were collected on subject 1. It can be noted that it took subject 1 fewer trials to reach criterion for Sets II and III; he required 12 days on Set I and 7 days on Sets II and III.

Subject 2. Subject 2 reached criterion on Set I in 11 days, Set II

in 5 days, and Set III in 5 days. Responses from all three sets maintained across time, i.e., subject 2 had 79 of 81 probes correct after training on those items had been completed. Probes after the termination of training were taken across a 4½-week span.

Subject 3. Subject 3 had the longest baseline phase; it extended 5 weeks prior to the training of Set I. He responded correctly to three of a total of 99 baseline probe items. Subject 3 reached criterion on Sets I and II after 11 days, on Set III after 8 days. Subject 3 had 27 of 33 probe items correct after training on Sets I and II had been completed. There were no Set III maintenance probes because the child enrolled in another preschool.

Free Play Generalization Data

Figure 2 depicts the frequency of Agent-Action-Object (AgAO) responses for subjects 1, 2, and 3 during the free play generalization period. Agent-Action-Object responses included any response which

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Insert Figure 2 about here

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contained at least two elements of this three-element form. All subjects essentially had extremely low rates of AgAO responses during baseline. At the onset of training there was no immediate increase in the frequency of AgAO responses. The frequency of these responses increased as training progressed across sets but was quite variable across individual subjects.

Subject 1. For subject 1 the average daily frequency of AgAO combination responses was 29 times greater during Intervention III than during Baseline, an increase from 0.2 to 4.9. It can be noted in Figure 2 that the frequency of AgAO responses for subject 1 did not appear to greatly increase until Intervention Phases II and III.

Subject 2. For subject 2 the average daily frequency of AgAO responses changed from 0.0 to 0.8 to 0.6 to 3.0 across the intervention phases and maintained at 3.1 average during the follow-up phase. As with subject 1, subject 2's AgAO responses did not appear to increase greatly during Intervention I and II.

Subject 3. During Intervention I subject 3's mean daily frequency of AgAO responses increased from 1.3 to 4.9. During Phase II the mean daily frequency was 6.1 and during Phase III, 5.1. Unlike subjects 1 and 2, subject 3 showed an immediate increase in AgAO responses during Intervention I.

To summarize, the baseline rate of AgAO responses during free play was essentially zero for all subjects. During training of Sets I and II there were marked increases in the average frequency of AgAO utterances. As would be expected, the most substantial increases were observed concurrent with the latter phases of training, particularly during the training of Set III. Posttraining data, that is, follow-up observations, further documented the functionality of the trained syntactic structure. Although the average frequencies of each child's AgAO usage

declined slightly, they maintained at levels substantially above baseline. In addition the frequency of expressive language per se observed during free play increased for all subjects. This increase began only after the onset of training.

Video Probe Generalization Data

Data was intermittently collected on video probes. Both the lexical (actual words spoken) and syntactical responses to video tapes were analyzed. For all subjects, the lexical responses for Sets I, II, and III generalized only after each set had been specifically trained.

On the other hand, it was noted that the syntactical form began to generalize to untrained sets prior to the training of those sets. The syntactical form generalized and maintained across all sets after training was completed on any given set. Moreover, on the 6-week follow-up video probe, the syntactical form maintained across all subjects at 100% accuracy.

Discussion

The results of this study demonstrated the efficacy of a training procedure combining behavioral techniques and psycholinguistic targets in systematically teaching a functional, complex syntactical form to three language-delayed children.

The spontaneous, generative use of the core syntactical form in an unstructured free play context and the generalization of the complex syntactical form to video probes were documented. Further, the follow-up video probe reflected the long term maintenance of the syntactical

form trained.

This study was unique in that it utilized dynamic relationships between persons and objects that were part of the subjects' environment. These relationships were the stimulus events that the subjects were trained to map linguistically with agent-action-object word strings.

A main purpose of any language training procedure should be to provide language that is functional for the child in his environment. The results of this study suggest that a complex syntactical form previously absent from the child's repertoire can be specifically trained and the basic form of this structure will be used spontaneously by the child in his natural environment.

Some questions remain concerning the effectiveness of this training package, e.g., the extent to which the child generalizes these responses to more removed settings, the home, and/or other preschool placements. Research is needed to identify the components of the training procedure and their specific effect on acquisition, generalization, and maintenance. Training and generalization of even more complex syntactical forms in which the subject and verb phrases are expanded is also necessary. In addition, study of children's lexical and syntactical responses should be expanded to include the investigation of the semantic features of those responses.

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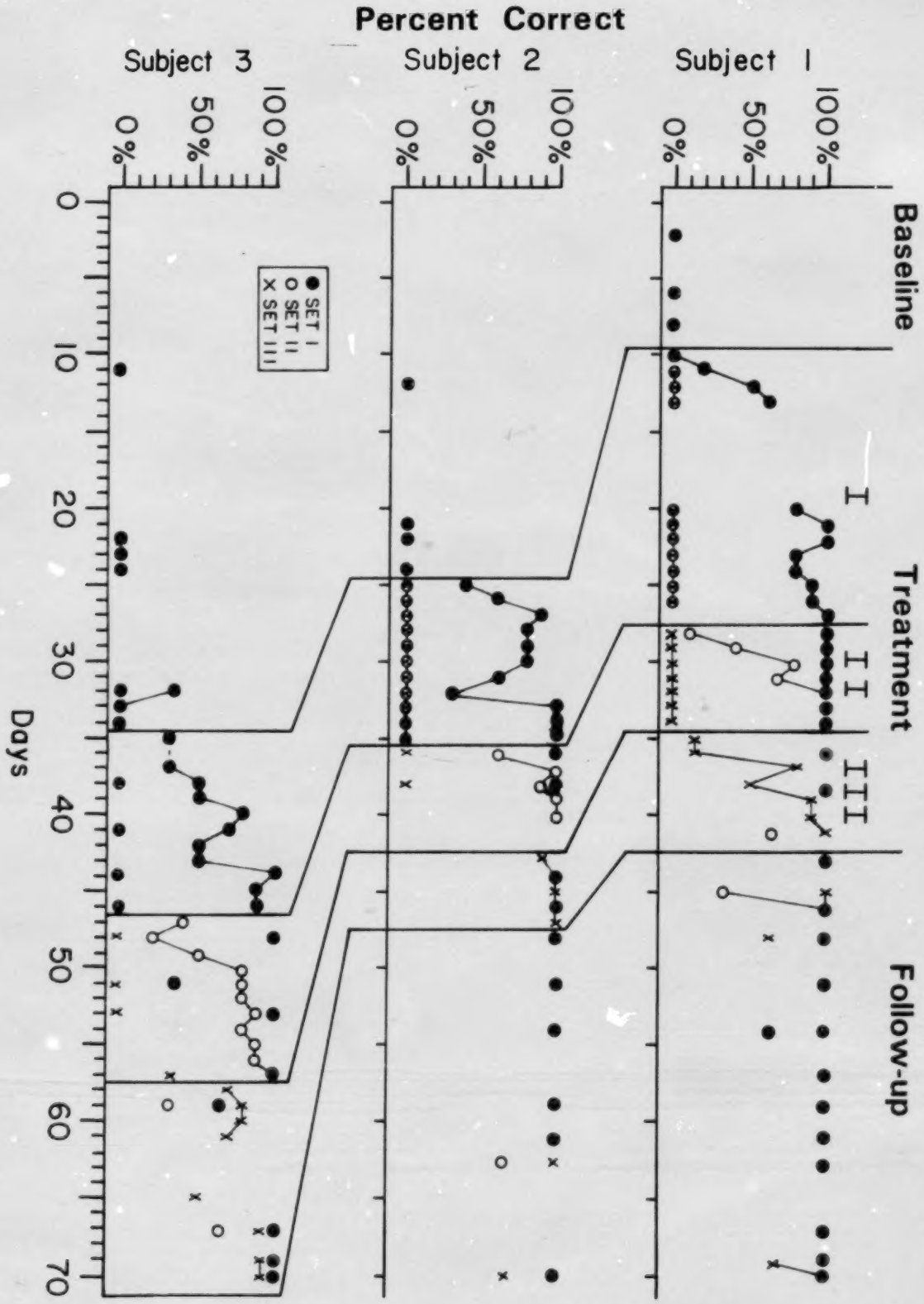
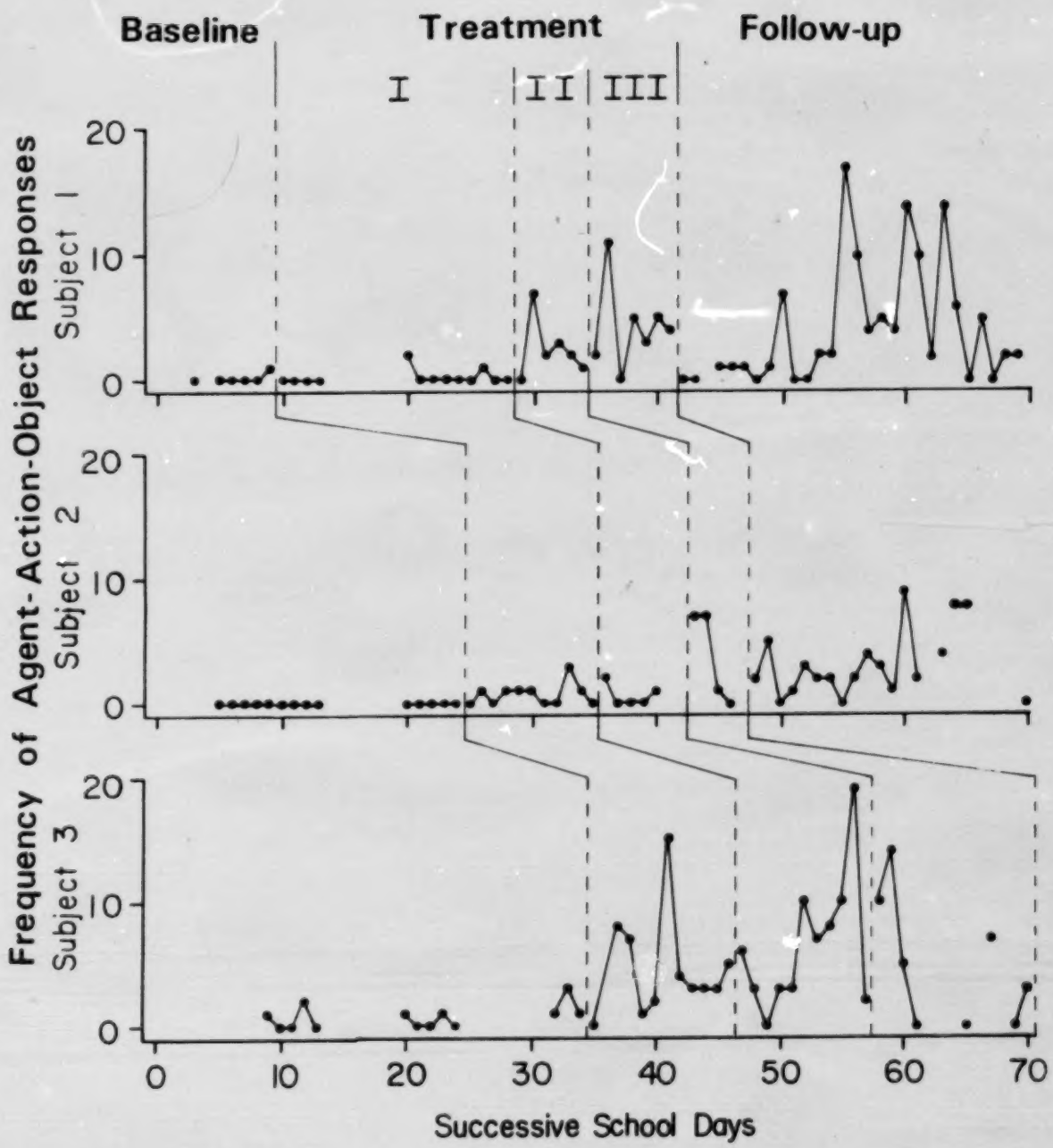
Figure Captions

Figure 1. The daily percentage of responses lexically and syntactically correct during baseline, intervention (Set I, Set II, and Set III), and follow-up conditions for subjects 1, 2, and 3, respectively.

Figure 2. The daily frequency of Agent-Action-Object responses during free play generalization for subjects 1, 2, and 3, respectively.


Percent Correct
Subject 3
Subject 2
Subject 1
0%
50%
100%
Baseline
Treatment
Follow-up
I
II
III
SET I
SET II
SET III
Days
0
10
20
30
40
50
60
70


Baseline
Treatment
Follow-up
I
II
III
Frequency of Agent-Action-Object Responses
Subject 1
Subject 2
Subject 3
20
10
0
0
10
20
30
40
50
60
70
Successive School Days